SVECHNIKOV, V. N.

SALLI, I.V.; SVYECHNIKOV, V.M., diysnyy chlen.

Coalescence of carbon impurities in tempering wrought iron. Dop.AN URSR no.5:358-363 '51. (MLRA 6:9)

1. Akademiya nauk Ukrayins'koyi RSR (for Svyechnikov). 2. Dnipropetrovs'kyy derzhavnyy universytet (for Salli). (Wrought iron)

SVECHNIKOV, V. N.

MOYSYEYENKO, O.S.; SVYECHNIKOV, V.M., diysnyy chlen.

Effect of the duration of low temperature annealing on the strength of tempered tool steel. Dop.AN URSR no.3:232-236 '52. (MIRA 6:9)

1. Akademiya nauk Ukrayins'koyi RSR (for Svyechnikov). 2. Mykolayivs'kyy korablebudivnyy instytut im. admirala S.O.Makarova (for Moysyeyenko).
(Tool steel)

SVECHNIKOV, V. N.

SALLI, I.V.; SVYECHNIKOV, V.M., diysnyy chlen.

Coalescence of cementite in carbon steel. Dop.AN URSR no.4:342-347 '52. (MLRA 6:10)

1. Akademiya nauk Ukrayins'koyi RSR (for Svyechnikov). 2. Dnipropetrovs'kyy derzhavnyy universytet (for Salli). (Cementite)

SVECHNIKOV, V. N.; GRIDNEV, V. N.

Steel - Brittleness

Annealing brittleness of structural steels. Trudy Inst. chern.met. AN URSR.no.5, 1952.

9. MONTHLY LIST OF RUSSIAN ACCESSIONS, Library of Congress, December 1952. Uncl.

SVECHNIKOV, V. N.

MOYSEYENKO, O.S.; SVYECHNIKOV, V.M., diysnyy chlen.

Mechanical properties of martensite hardened alloy tool steels. Dop.AN URSR no.6:487-493 '52. (MLRA 6:10)

1. Akademiya nauk Ukrayins'koyi RSR (for Svechnikov). 2. Mykolayivs'kyy korablebudivnyy instytut im. admirala S.Y.Makarova (for Moyseyenko).
(Tool steel)

MOYSEYENKO, O.S.; SVECHNIKOV, V.M., diysnyy chlen.

Effect of the regime of heating on properties of hardened carbon steels. Dop.AN URSR no.3:220-225 '53. (MLRA 6:6)

1. Mykolaivs kyy korablebudivnyy instytut im. S.Y.Makarova (for Moyseyenko).
2. Akademiya nauk Ukrayins'koyi RSR (for Svechnikov). (Steel--Heat Treatment)

POLEZHENTSEV, Vladimir Sergeyevich; SVECHNIKOV, V.N., redaktor; SAMOKHVALOV, Ya.A., redaktor; KRYLOVSKAYA, N.S., tekhnicheskiy redaktor.

[Very-low-temperature treatment of fast cutting steel] Obrabotka bystrorezhushchei stali glubokim kholodom. Kiev, Izd-vo Akademii nauk Ukrainskoi SSR, 1954. 77 p. (MLRA 9:1)
(Metals at low temperatures) (Steel)

SVECHNIKOV, V. N. FD 369

USSR/Physics - Cold Shortness of Steel

Card 1/1

Author : Svechnikov, V. N. and Golubev, S. S.

Title : On the cold shortness of high-phosphorus steel

Periodical : Zhur. tekh. fiz. 24, 3, 467-472, Mar 1954

Abstract : Authors investigate mechanism of the effect of phosphorus on cold shortness of steel and attempt to eliminate contradictions in existing viewpoint on the effect of grain size on brittle failure. Establish that presence of fine grains in ferritic-pearlitic mixture produces high resistance of steel to brittle failure only in the case when groups of ferritic-pearlitic grains have no near-similar crystallographic orientation. Furthermore, they conclude that similar fine grains have different effect on cold shortness of steel depending on method used for obtaining fine grain structure, namely, hot mechanical work or heat treatment. Four references, all USSR; one 1934, others 1949-1951. Graphs.

Institution :

Submitted : September 30, 1953

USSR/Physics - alloy steel grains FD-1074

Card 1/1 Pub. 153 - 10/24

Author : Svechnikov, V. N., and Movchan, B. A.

Title : Structure of the primary grains of alloy steels during heating to a high temperature (1300-1400°C).

Periodical : Zhur. tekh. fiz., 24, No 10, 1823-1829, Oct 1954

Abstract : The authors study by direct methods the structure of the grains and the boundary zones of several alloy steels (results tabulated), namely at temperatures of overheating. They find that chromium and wolfram diffuse into the boundary zones of the grains and that manganese may concentrate at internal defects because of rolling. They describe their experimental procedures and evaluate their results.

Institution : -

Submitted : January 29, 1954

SVECHNIKOV, V. N. and SPEKTOR, A. Ts.

"The Effect of Zirconium on the Polymorphism of Iron"

an article in the book "Questions on the Physics of Metals and Metal Science", AS Ukr. SSR, Kiev, 1955, 151 pp.

So: Sum No 1102, 19 Oct 56

SVECHNIKOV, V. N., GRIDNEV, V. N., KOCHERZHINSKIY, Yu. A.

"On the Transformation of Ferrite Into Austenite During Electric Heating"

an article in the book "Questions on the Physics of Metals and Metal Science", AS Ukr. SSR, Kiev, 1955, 151 pp.

So: Sum No. 1102, 19 Oct 56

1 - 123

with 4.0% Zr actually contained only [illegible] were investigated at 900-72° for the $\alpha \to \gamma$ and $\gamma \to \alpha$ transformations of Fe. At a true Zr content of 3.5%, reversible [illegible] formation will take [illegible] 10 [illegible] Thus a value [illegible] and [illegible]

SVECHNIKOV, V. N.

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[illegible] into austenite upon electro- [illegible] V. N. Gridnev, and Yu. A. [illegible] Fiz. Metal i Metalloved. [illegible]

[illegible] Electric heating was used to get heating rates of up to 280°/sec., starting at 45°/sec. The temp. curve started to show discontinuity at about 750° (start of the transformation)(between 743 and 762°, depending upon the rate of heating), but the transformation was complete only at 012°-30°. W. J.

MT

PG

SVECHNIKOV, V.N.

Kinetics of $\alpha \rightarrow \gamma$ transformation during rapid heating of carbon steels with pearlite structures of different degrees of dispersity. V. N. Svechnikov, V. N. Gridnev, and Yu. A. Kocherzhinskii (Doklady Akad. Nauk SSSR, 1955, 103, 1025—1028).—The expression $v_T = K$ is derived empirically, where v is the average rate of heating (degrees per sec.) between 600° and the transition point T; $K = 40$ for coarse-grained pearlite structures, 43·5 for sorbite structures, and 48 for martensite structures. The expression $v_T = q/c$ is derived, where q is the latent heat of transformation, and c is the sp. heat of the steel prior to transformation.

R. TRUSCOE

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equilibrium curve y/y + a can be quite well approximated in many cases by the 2nd order curves. The equation ... was obtained from the phase equilibrium

SVECHNIKOV, V.N.; MOVCHAN, B.A.

Equilibrium of chemical inhomogeneity in alloys at high temperature. Sbor. nauch. rab. Inst. metallofiz. AN USSR no.7:32-47 '56. (MIRA 11:1)
(Metals at high temperature)
(Metallography)

SVECHNIKOV, V. N.

12025* (Russian.) A More Precise Determination of the Equilibrium Diagram of the Fe-As System. Utochnenie diagrammy sostoianiia sistemy zhelezo-mysh'iak. V. N. Svechnikov and A. K. Shurin. Akademii Nauk Ukrainskoi RSR, Dopovidi no. 1, 1957, p. 27-28.

Alloys studied contained 0 to 12.5% As, 0.016 to 0.020% C. The liquidus and solidus curves and the boundaries of the $\alpha + \gamma$ field were determined.

fra RG
aug

SVECHNIKOV, V.N.

Equilibrium diagram of an iron-carbon-arsenic system in the region of iron-rich alloys. ... K. ... and V. N. ... 1937

4E3d

region ... of the castings eliminated dendritic segregation of As and C. The system was studied by means of the differential ...

137-58-6-13265

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 299 (USSR)

AUTHORS: ~~Svechnikov, V.N.,~~ Gridnev, V.N., Kocherzhinskiy, Yu.A.

TITLE: On the Effect of Carbon Content and Original Structure on the Temperature of Austenite Formation in Iron-carbon Alloys on Rapid Heating (O vliyanii soderzhaniya ugleroda i iskhodnoy struktury na temperaturu obrazovaniya austenita v zhelezougl-lerodistykh splavakh pri bystrykh nagrevakh)

PERIODICAL: Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR, 1957, Nr 8, pp 42-43

ABSTRACT: The temperatures of $\alpha-\gamma$ transformations (T) during electric heating at 20-200 degrees-C/sec of carbon steel containing 0.045-1.08% C with various structures were determined by the dilatometric method. In annealed steels containing structurally free ferrite, $\alpha-\gamma$ T begins at 755-760°C and ceases at 900-910°. In annealed steels containing no structurally free ferrite, $\alpha-\gamma$ T proceeds to completion at the stopping temperature on the thermal curves at 750-755°. In tempered steels the $\alpha-\gamma$ T takes place at lower temperatures: 30-35° lower in eutectoid steel and below the equilibrium point A_3 in hypo-eutectoid steel.

N.K.

Card 1/1

1. Carbon-iron alloys--Analysis 2. Carbon-iron alloys--Temperature factors 3. Carbon--Phase studies

137-58-6-13258

Translation from: Referativnyy zhurnal, Metallurgiya, 1958, Nr 6, p 298 (USSR)

AUTHORS: Shurin, A.K., Svechnikov, V.N.

TITLE: The Iron-carbon-arsenic Alloys (Sistema zhelezo-uglerod-mysh'yak)

PERIODICAL: Sb. nauchn. rabot In-ta metallofiz. AN UkrSSR, 1957, Nr 8, pp 58-64

ABSTRACT: The alloys were smelted of metallic As (96%), Armco Fe, electrolytic Fe, and an alloy containing $\sim$5% C in a Tammann furnace. Homogenization was done at 900-1200°C during 6-8 hr, which fully eliminated dendritic liquation of As. Investigation was conducted by the methods of differential dilatometric analysis and by microstructural methods of measuring of resistivity during heating. Four cross sections were constructed for constant As contents: 0.8, 1.4, 2.8, and 4.5%. As was above points A_1 and A_3. At 1.75% As the $\alpha + \gamma$ and $\delta + \gamma$ regions unite. At 2.4% As the α and δ regions unite. The temperature of the solidus drops sharply with an increase in As content (by 220-320° depending on C content.) The temperature of the eutectic transformation L $\rightleftarrows \gamma + Fe_3C$ with 4.5% As

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SVECHNIKOV, V.N.

32-12-71/71

AUTHORS: Svechnikov, V.N., Starodubov, K.F, Members of the AN Ukrainian SSR; Dymov, A.M., Yel'yanov, A.A., Chernikhov, Yu.A., Shchapov, N.P., Blanter, M.Ye., Professors

TITLE: Lev Samuilovich Dlugach (Deceased) (Lev Samuylovich Dlugach).

PERIODICAL: Zavodskaya Laboratoriya, 1957, Vol. 23, Nr 12, pp. 1527-1528 (USSR)

ABSTRACT: The deceased is here praised as being the greatest promoter of the development and spreading of works laboratories. He was born at Grodno on June 8, 1887; he finished his studies at the Polytechnic Institute at Leningrad and emigrated to France soon later. In France he developed his activities as engineer for research work in the metallurgical industry and in recent times he was head of a station for thermal research in a laboratory. At the outbreak of the Bolshevik revolution he returned to Russia, where he worked at various metallurgical industrial plants in the USSR. From 1931 to 1941 he worked as professor at various universities in the USSR, and during the last years of his life he occupied the chair for the technology of metals at the Electrotechnical Institute at Leningrad. As a result of the initiative taken by him numerous central laboratories

Card 1/2

SVECHNIKOV, V.N.; KOCHERZHINSKIY, Yu.A.: PAN, V.M.; SHURIN, A.K.

Investigating chromium-niobium-vanadium alloys. Issl. po zharopr. splav. 3:168-177 '58. (MIRA 11:11)
(Chromium-niobium-vanadium alloys--Metallography)
(Phase rule and equilibrium)

SVECHNIKOV, V.N., akademik, doktor tekhn.nauk; YAKOVCHUK, Yu.Ye., kand.tekhn. nauk

Heat treatment and alloying of phosphorus steels. Izv. vys. ucheb. zav.; chern.met. no.5:163-169 My '58. (MIRA 11:7)

1.AN USSR (for Svechnikov). 2.Kiyevskiy politekhnicheskiy institut.
(Steel--Metallurgy) (Phosphorus)

SVECHNIKOV, V.N., doktor tekhn.nauk, akad.; GOLUBEV, S.S., dotsent

Cold-brittleness of carbon steel with high phosphorous content. Izv.vys.ucheb.zav.; chern.met. no.6:117-130 Je '58. (MIRA 12:8)

1. Kiyevskiy politekhnicheskiy institut. Rekomendovano kafedroy metallovedeniya Kiyevskogo politekhnicheskogo instituta. (Steel--Brittleness)

SOV/129-58-9-3/16

AUTHORS: Svechnikov, V. N. Academician Ac.Sc. Ukr.SSR and
Trush, I. Kh., Engineer

TITLE: Influence of Nitrogen on the Tendency to Growth of the Austenitic Grain of Medium Carbon Phosphorous Steel (Vliyaniye azota na sklonnost' k rostu austenitnogo zerna sredneuglerodistoy fosforistoy stali)

PERIODICAL: Metallovedeniye i Obrabotka Metallov, 1958, Nr 9, pp 15-19 + 2 plates (USSR)

ABSTRACT: The authors are unaware of published information on the simultaneous influence of an increased content of P and N on the grain size in medium carbon steel and changes in the grain size with the heating temperature. The work described in this paper is a further development of earlier published work (Refs 1 and 2). The experiments were effected on steel, the P content of which was higher than the respective P content of standard Bessemer rail steel for the purpose of detecting more clearly the influence of P on the properties of steel and also for the purpose of studying the possibilities of increasing the P content of such steels. According to Riees and Hopkins (Ref 3) oxygen

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Influence of Nitrogen on the Tendency to Growth of the Austenitic Grain of Medium Carbon Phosphorous Steel

chemical compodition of the investigated alloys is entered in a table, p 16. The heats weighing 33 to 35 kg were poured into two cast iron moulds; in one of these the metal was deoxidised with aluminium (500 g per ton), in the other the steel was not deoxidised. The conditions of smelting and pouring were equal in both cases. A third of the ingot was cut off and the remaining, sound part of the casting was forged into a square rod with side lengths of 12 to 13 mm. All the rods were normalisation annealed under shop conditions at 900°C for thirty minutes. The specimens were heated at 800 to 1050°C with steps of 50°C each and annealing times of 1.5 hours, followed by cooling in air. The grain size was determined under the microscope on the basis of the network of the excess ferrite. For expressing graphically the dependence of the grain size on the temperature, the method of differential counting of the grains was applied which was proposed by K.A.Malyshev (Ref 7). The kinetics of grain growth for the investigated alloys is expressed by a graph summarising the

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Influence of Nitrogen on the Tendency to Growth of the Austenitic Grain of Medium Carbon Phosphorous Steel

following three magnitudes: the average size of the coarse grains, the average size of the small grains and their percentual ratio in the area of the field of vision of the microscope. In Fig.1 the dependence is graphed of the grain size on the temperature for heats of various chemical compositions. The individual heats are designated by fractions in which the numerator is the serial number of the heat and the denominator is the serial number of the ingot, whereby even numbers designate ingots which were deoxidised with aluminium and odd numbers designate ingots which were not deoxidised. The lower curves indicate the growth of the fine grains, whilst the higher curves indicate the growth of the coarse grains for both ingots as a function of the temperature. The influence of phosphorus on the grain size has not been studied in detail in this work, since it is known that P brings about an increase in the grain size of the austenite. Figs. 2 and 3 (plate) show the micro-structure of ingots deoxidised with aluminium after normalisation annealing at various temperatures. The

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results of metallographic analysis are shown in the Figures 4 and 5 (plate); in steel containing 0.025% N numerous clearly pronounced deformation lines can be seen in the ferrite, whilst in the case of a nitrogen content of 0.006% such lines can also be seen but they are less numerous. According to Chatterjca and Nijhawan (Ref 12), for aluminium contents exceeding 0.4% separation of an acicularly shaped component can be observed at grain boundaries and in the case of high aluminium contents there is a definite tendency to agglomeration. These authors (Ref 12) have proved conclusively that the acicular component is aluminium nitride. On reducing the aluminium content, the quantity of such nitride acicules decreases and then ceases to exist; in steels not containing aluminium, such separations have not been detected. Chatterjca and Nijhawan (Ref 12) arrived at the conclusion that the solubility of nitrides in austenite and their agglomeration depends on the content of aluminium in the steel and this hypothesis enables better explanation of

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the relations governing the grain growth than other existing hypotheses; the experimental data given in their paper appears sufficiently conclusive. The results were obtained on steel (containing 0.4% C, 0.6-0.7% Mn and 1% Al), the carbon content of which was near to that of the steel used in the experiments of the authors of this paper; the aluminium content was considerably higher. Furthermore, they applied nitriding instead of introducing nitrogen into the liquid steel. Due to this difference in the aluminium content and the sub-microscopic scale of the separations of aluminium nitrides, the authors of this paper could not count on detecting aluminium nitrides by micro-structural analysis and, therefore, there is no discrepancy between their results and the results of Chatterjca and Nijhawan (Ref 12). Kato et alii (Ref 13) also apparently (according to an abstract) did not detect a clearly

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APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001654110011-1"

SVECHNIKOV, V.N., akademik; TRUSH, I.Kh., inzh.

Effect of nitrogen on the mechanical properties of medium carbon phosphorous steel. Izv. vys. ucheb. zav.; chern. met. no.12: 81-88 D '58. (MIRA 12:3)

1. Kiyevskiy politekhnicheskiy institut. 2. AN USSR (for Svechnikov).

(Steel--Brittleness) (Gases in metals)
(Nitrogen)

SOV/126-6-3-17/32

AUTHORS: Svechnikov, V. N. and Yakovchuk, Yu. Ye.

TITLE: Influence of Phosphorus and Nickel on the Cold Brittleness of Medium Carbon Steel (Vliyaniye fosfora i nikelya na khladnolomkost' sredneuglerodistoy stali)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 3, pp 505-511 (USSR)

ABSTRACT: The investigations described in this paper represent a branch of the work carried out in recent years in the laboratory of the authors relating to cold brittleness of phosphorous medium carbon steel. I. A. Rinebolt and W. Y. Harris (Ref.4) published results of investigations of the separate influence of P and Ni on the cold brittleness of steel. However, as far as the authors are aware, the simultaneous influence of these elements has not been studied. Furthermore, the influence of these elements on the cold brittleness was studied predominantly on low carbon steels, usually not exceeding 0.2% and in no case exceeding 0.3%. Such limitation of the carbon content in the investigations is inadvisable since it was established that with increasing carbon content the unfavourable influence of P increases and the favourable

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Influence of Phosphorus and Nickel on the Cold Brittleness of Medium Carbon Steel

about a decrease by 1.5 to 2.0 kgm/cm^2. It was found that for the given P content the impact strength and its temperature dependence depends on the grain size of the steel. P dissolves preferentially in the ferrite and not in the austenite and does not influence appreciably the eutectoidal content of carbon. The micro-hardness of ferrite increases continuously from 131 to 241 units if the P content is raised from 0.11 to 1.42%. The influence of P on the cold brittleness cannot be explained solely by its influence on the grain size, it has also to be explained from the point of view of its influence on the properties of the solid solution. The assumption has been expressed that P influences the structure of the crystal lattice and brings about an increase of the resistance to displacement at lower temperatures. The results of impact tests on steels containing 0.15% P and alloyed with various contents of Ni are entered in Table 2 and graphed in Fig.2. The results obtained with the three steels indicate that an increase in the Ni content brings about a progressive

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brittle fracture, the authors investigated the influence of heat treatment, consisting of hardening in water from 850°C followed by tempering at 650°C for one hour, as a result of which a disperse uniformly distributed granular cementite was obtained in a fine grain ferritic matrix. In Fig.6 the impact strength vs. temperature curve is given for one of the tested steels in the initial normalised state, as well as after the here mentioned heat treatment. It can be seen that the temperature of transition into the brittle state is not appreciably affected by such a heat treatment but the impact strength is considerably improved by it and increases to 3.6 kg/cm^2 at +20°C and 1.8 kg/cm^2 at -40°C as a result. It can, therefore, be concluded that the temperature of appearance of the first signs of brittle fracture and the temperature of the complete transformation of the steel into the brittle state are determined fundamentally by the properties of the ferrite, whilst the magnitude of the impact strength in the tough state is limited by the quantity of pearlite in the normal case and, under special conditions, by the shape of

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SOV/126-6-4-13/34

AUTHOR: Svechnikov, V.N., Pan, V.M. Shurin, A.K.

TITLE: Effect of Phosphorus and Arsenic on the Lattice Parameter and Hardness of α-Iron (Vliyaniye fosfora i mysh'yaka na parametr kristallicheskoy reshetki i tverdost' al'fa-zheleza)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 4, pp 662-664 (USSR)

ABSTRACT: High purity electrolytic iron was used for the preparation of the experimental Fe-P and Fe-As alloys melted in vacuum (10^{-4} mm Hg) in the former, and in argon in the latter case. The alloying elements were introduced in the form of master alloys of the eutectic composition (10.5% P or 30% As) prepared by powdered metallurgy methods (sintered in evacuated quartz ampoules). No losses of the alloying elements occured on smelting, and the carbon content of the Fe-P and Fe-As alloys was 0.004 - 0.010% and 0.016 - 0.020% respectively. To remove the segregation effects the

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Effect of Phosphorus and Arsenic on the Lattice Parameter and Hardness of α-Iron

45 and 10 hrs at 400, 500, 650 and 810°C) From these data solid solubility of P and As in α-iron at various temperatures was determined. The solid solubility curve of phosphorus in α-iron is shown on Fig.3, that showing solubility of arsenic in α-iron is reproduced in another article (Ref.12). Both phosphorus and arsenic were found to increase hardness of α-iron. The micro and macro-hardness curves (graphs a and b) for the Fe-P and Fe-As Alloys are shown on Fig.4 and 5 respectively. The difference between the values of micro and macro-hardness are attributed to the fact that the former was determined

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SOV/126-6-5-14/43

AUTHORS: ~~Svechnikov, V.N.~~, and Yakovchuk, Yu.Ye.

TITLE: Influence of Heat Treatment on the Structure and Cold Shortness of Phosphor Steel (Vliyaniye termicheskoy obrabotki na strukturu i khladnolomkost' fosforistoy stali)

PERIODICAL: Fizika Metallov i Metallovedeniye, 1958, Vol 6, Nr 5, pp 849 - 857 (USSR)

ABSTRACT: Two anomalies are encountered in medium carbon phosphorus-containing steel .. 1) the existence of two ferrites, one of which is enriched in P and appears in relief in micro-sections; 2) separation of cementite from pearlite, forming a structurally independent constituent if the P exceeds 0.15% (Refs 1, 2, 3). Svechnikov et al. (Ref 1) expressed the desirability for a special heat treatment to be worked out which would bring about isolation of a considerable quantity of P in "relief" pearlite, thus lowering the temperature at which cold shortness sets in. The authors of this paper decided to explore the possibilities of such a heat treatment. First, the influence of P content on the temperatures of the A_{c1}, A_{c3} and A_{cm} points were investigated, the methods adopted being based on the work of Oelsen (Ref 5). C and P behave

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differently both qualitatively and quantitatively in α and γ-iron; they rapidly redistribute themselves during phase changes, P mainly concentrating in ferrite and C mainly in austenite. This non-uniformity in distribution remains after the phase changes are complete. Steels of various C and P content were tested dilatometrically at a heating and cooling rate of 3 °C/min, except in cases where the critical points were above 1 000 °C or where the temperature of completion of dissolution of secondary cementite in hyper-eutectoid steels was used for determining the critical points, when a micro-structural method was used. The results are shown in Figures 1 (heating) and 2 (cooling) in the form of graphs (temperature against % C) for steels of various P contents. Figure 3 shows the boundaries of the one-phase region of austenite in relation to P content for steels of constant C content. In Figure 4, experimental and theoretical curves for the beginning and completion of the α to γ transformation on heating steels with a constant P content are shown. Figure 5 is a micro-photograph of 0.8% C, 0.3% P steel,

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Influence of Heat Treatment on the Structure and Cold Shortness of Phosphor Steel

cooled from the one-phase region of austenite and quenched from 850 °C after 15 minutes' soaking. Martensite, cementite and ferrite are evident. The same alloy slowly cooled is shown in Figures 6 and 7. Here, the pearlite is surrounded by a network of ferrite within which again there is a network of cementite. The absence of phosphide in these micro-sections is probably due to redistribution of the dissolved phosphide between the α and γ phases. In order to estimate the phosphide in ferrite, the micro-hardness was plotted against % P (see Figure 8) and from this diagram the relief ferrite in steels containing 0.3 to 0.4% C and 0.15% P was found to contain 0.25 to 0.70% P and that in 0.5 to 0.7% C steels, 1.2 to 1.5% P. The P content of the ferrite network containing the cementite network was 1.21 - 1.36%, which approaches the solubility of P in α-iron at temperatures of 800 to 870 °C at which the austenisation of steels containing 0.2 and 0.3% P is complete. A P content exceeding 0.05% reduces the strength of steel. The reasons for this have remained obscure until recently. The authors of this paper, in an

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effort to elucidate this problem, have carried out the following experiments: refined steel containing 0.48% C, 0.142% P, 0.228% Si, 0.44% Mn and 0.26% S was cast into small ingots which were forged into rods. These in turn were cut into billets for making standard test pieces. The billets were normalised at 800 °C and one half of them were made into test pieces for an impact test; the other half were heated to and soaked at 760 °C for one hour and then air-cooled. Sharpy impact tests were carried out at 0 °C and various temperatures below. The results are given in a table and in Figure 9. The impact strength of the latter specimens is greater at all testing temperatures than that of the former. Their micro-structure is shown in Figure 10 and approaches that aimed at. The microhardness of the isolated islands of "relief" ferrite was found to be 210 kg/mm^2, that of the surrounding ordinary ferrite 135 kg/mm^2. Such a hardness of "relief" ferrite suggests a P content of up to 1%.

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Influence of Heat Treatment on the Structure and Cold Shortness of Phosphor Steel

There are 10 figures, 1 table and 11 references, 8 of which are Soviet and 3 German.

ASSOCIATION: Kiyevskiy politekhnicheskiy institut (Kiyev Polytechnical Institute)

SUBMITTED: March 6, 1957

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Svechnikov, V. N.

18(7) PHASE I BOOK EXPLOITATION SOV/3355

Akademiya nauk SSSR. Institut metallurgii. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, t. IV (Studies on Heat-resistant Alloys, vol. 4), Moscow, Izd-vo AN SSSR, 1959. 400 p. Errata slip inserted. 2,200 copies printed.

Ed. of Publishing House: V. A. Klimov; Tech. Ed.: A. P. Guseva; Editorial Board: I. P. Bardin, Academician; G. V. Kurdyumov, Academician; N. V. Ageyev; Corresponding Member, USSR Academy of Sciences; I. A. Oding, I. M. Pavlov, and I. F. Zudin, Candidate of Technical Sciences.

PURPOSE: This book is intended for metallurgists concerned with the structural metallurgy of alloys.

COVERAGE: This is a collection of specialized studies of various problems in the structural metallurgy of heat-resistant alloys. Some are concerned with theoretical principles, some with descriptions of new equipment and methods, others with properties of specific materials. Various phenomena occurring under specified conditions are studied and reported on. For details, see Table of Contents. The articles are accompanied by a number of references, both Soviet and non-Soviet.

Studies (Cont.) SOV/3355

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Svechnikov, V.N.

PHASE I BOOK EXPLOITATION SOV/4177

Akademiya nauk Ukrainskoy SSR. Institut metallofiziki

Voprosy fiziki metallov i metallovedeniya (Problems in the Physics of Metals and Metallography) Kiyev, Izd-vo AN USSR, 1959. 215 p. (Series: Its: Sbornik nauchnykh rabot, no. 10) 3,000 copies printed.

Ed. of Publishing House: O.M. Pechkovskaya; Tech. Ed.: R.A. Buniy; Editorial Board: V.N. Svechnikov, Academician, Academy of Sciences UkrSSR (Resp. Ed.), S.D. Gertsriken, Doctor of Physics and Mathematics, and I.Ya. Dekhtyar, Doctor of Technical Sciences.

PURPOSE: This collection of articles is intended for scientific workers, aspirants and engineers working in metal physics, metallography and metallurgy, and for students in advanced courses of metallurgy and physics departments.

COVERAGE: The collection of articles gives the results of an investigation of the effect of high heating rates, thermal treatment, deformation and crystallization conditions on the phase transformations, structure and properties of metals and alloys, and of the effect of alloying additives on volume and intergranular

Problems in the Physics of Metals and Metallography SOV/4177

diffusion in alloys, as well as the effect of repeated tempering by ultrasound irradiation on the physical properties of alloys. There is also a description of an x-ray camera for studying the structure of the individual grains. The following personalities are mentioned: V. Raksha, A.A. Smirnov, S.G. Glazunov, Ye.I. Morozov, V. Danilenko, L.M. Kikot', and I. Ya. Dekhtyar', Doctor of Technical Sciences. There is a bibliography of Soviet and non-Soviet references at the end of each article.

AVAILABLE: Library of Congress

Card 6/6

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9-20-60

SVECHNIKOV, V.N.; KOCHERZHINSKIY, Yu.A.; PAN, V.M.; MAYSTRENKO, Ye.Ye.;
SHURIN, A.K.

Investigating the chromium - niobium - vanadium system. Issl. po zharopr.splav. 4:248-246 '59. (MIRA 13:5)
(Chromium-niobium-vanadium alloys)

SVECHNIKOV, V.N.; SPEKTOR, A.TS.

Studying transformations in solidified Co-Cr alloys rich in cobalt. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.9:105-119 '59. (MIRA 12:9)

(Cobalt-chromium alloys--Metallography)
(Phase rule and equilibrium)

SVECHNIKOV, V.N.; KOCHERZHINSKIY, Yu.A.; MAYSTRENKO, Ye.Ye.; PAN, V.M.; SHURIN, A.K.

Investigating the Cr - Nb - V system. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.9:120-132 '59. (MIRA 12:9)
(Chromium-niobium-vanadium alloys--Metallography)
(Phase rule and equilibrium)

SVECHNIKOV, V.N.; SPEKTOR, A.TS.; MAYSTRENKO, Ye.Ye.

Investigating transformation in the solid state Co-Cr-Fe alloys. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.10:168-181 '59. (MIRA 13:9)

(Cobalt-chromium-iron alloys--Metallography)
(Phase rule and equilibrium)

APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001654110011-1"

SVECHNIKOV, V.N.; KOCHERZHINSKIY, Yu.A.

Transformations in annealed Armco iron during rapid heating. Sbor. nauch. rab. Inst. metallofiz. AN URSR no.10:182-185 '59. (MIRA 13:9)
(Iron--Metallography) (Annealing of metals)

Svechnikov, V.N.

PHASE I BOOK EXPLOITATION SOV/4502

Akademiya nauk SSSR. Nauchnyy sovet po probleme zharoprochnykh splavov

Issledovaniya po zharoprochnym splavam, tom 6 (Investigations of Heat-Resistant Alloys, Vol. 6) Moscow, 1960. 319 p. Errata slip inserted. 3,000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Institut metallurgii imeni A. A. Baykova. Nauchnyy sovet po probleme zharoprochnykh splavov.

Editorial Board: I. P. Bardin (Deceased) Academician, G. V. Kurdyumov, N. V. Ageyev, Corresponding Member, Academy of Sciences USSR (Resp. Ed.), I. A. Oding, I. M. Pavlov, and I. F. Zudin, Candidate of Technical Sciences; Ed. of Publishing House: V. A. Klimov; Tech. Ed.: S. G. Tikhomirova.

PURPOSE: This book is intended for research workers in the field of physics of metals and for metallurgists, particularly those working on heat-resistant alloys.

COVERAGE: This collection of 45 articles deals with various problems in the production of heat-resistant alloys. Special attention is paid to the mechanisms of deformation of such metals as aluminum, copper, iron, and nickel. Various defects and failures of metals are analyzed, and means for increasing the heat resistance and plasticity are described. Among the special problems discussed are: electrolytic conductivity of iron-aluminum alloys in the solid state; the mobility of atoms in nickel-iron alloys, depending upon defects of their crystalline structure; the kinetics of change in isolated pores; the irreversible thermal transformation of solid bodies, etc. No personalities are mentioned. References follow each article.

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SVECHNIKOV, V.N.; BELYAYEVA, V.P.; YAKOVCHUK, Yu.Ye.

Effect of alloying on the cold shortness of medium carbon steel with phosphorus. Izv.vys.ucheb.zav.; chern.met. no.4: 129-136 '60. (MIRA 13:4)

1. Kiyevskiy politekhnicheskiy institut.
(Steel alloys--Brittleness)

SVECHNIKOV, V. N.

27055

S/021/60/000/005/011/015
D210/D304

18.9200

AUTHORS: Svyechnykov, V.M., Academician UkrSSR and Pan, V.M.

TITLE: On phases of the chromium - nickel - columbium system

PERIODICAL: Akademiya nauk ukrayins'koyi RSR. Dopovidi, no. 5, 1960. 634-637

TEXT: Investigations were carried out on alloys of Cr, Ni and Cb of high purity within up to 50% by weight of Cb content. The samples were melted in an arc furnace, fitted with tungsten electrode and a water-cooled copper bottom, in atmosphere of pure argon. The total number of investigated samples was 116. The testing methods were as follows: differential thermal analysis, microstructure, X-ray examinations and dilatometric analysis. [Abstractor's note: No details of methods given.] It was found that in the ternary system Cr-Ni-Cb, between two intermetallic compounds: $CbCr_2$ and Ni_3Cb lies a quasi-binary region with eutectic transformations (Fig. 1). A new compound

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27055

S/021/60/000/005/011/015
D210/D304

On phases of the chromium...

was discovered, with a composition corresponding approximately to the formula: Ni_8, Cr_5 Cb_2 (51.3%, 28.4% and 20.23% respectively). This compound crystallizes from the liquid phase at $1175 \pm 5^\circ$ C and decomposes at $1160 \pm 5^\circ$ C, undergoing an eutectoid transformation: $\varepsilon \rightarrow \alpha + \gamma + \delta$, (where ε is $Ni_8\, Cr_5\, Cb_2$, α-a solid solution on a chromium basis, γ- a solid solution on a nickel basis and δ = $Ni_3\, Cb$). This transformation is accompanied by a volume decrease, the formation of the compound $Ni_8\, Cr_5\, Cb_2$ occurring with a marked volume increase. X-ray examination of the compound proved its lattice structure to be similar to that of the compound $CbCr_2$. On Fig. 2, a broken vertical section of the ternary Cr - Ni - Cb system is drawn on axes connecting the ternary intermetallic compound with chromium and the compound Ni_3Cb. It was found that $Ni_8\, Cr_5\, Cb_2$ showed no expansion area in the solid state. At temperatures higher than 1160° C there are four quasibinary sections

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27055
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D210/D304

On phases of the chromium ...

on axes connecting $Ni_8 Cr_5 Cb_2$ with Cr, Ni and compounds $CbCr_2$ and Ni_3Cb; all four of them give rise to diagrams with binary eutectic points, the temperature of which differ by less than 5° C; as this difference lies within the range of experimentall error, the authors assume that all eutectic points have the same temperature. The same temperature differences exist between that temperature and the melting point of the compound $Ni_8 Cr_5 Cb_2$, being 5 - 8°C only; this difference lies also in the range of experimental error. Isothermal sections of the ternary graph for 1175° and 1100° C are also given. It is seen that at temperatures below 1160° $Ni_8 Cr_5 Cb_2$ decomposes and that the quasibinary sections Cr - $Ni_8 Cr_5 Cb_2$, Ni - $Ni_8 Cr_5 Cb_2$, $CbCr_2$ - $Ni_8 Cr_5 Cb_2$ and $Ni_3 Cb$ - $Ni_8 Cr_5 Cb_2$ do not exist, being replaced by the quasibinary section Cr - Ni_3Cb. There are 4 figures, and 5 references: 4 Soviet-bloc and 1 non-Soviet-bloc. The references to the English language publication reads as follows: R.O. Williams,

Card 3/5

27055

S/021/60/000/005/011/015
D210/D304

On phases of the chromium ...

Journ. Metals, 9, 1257, (1957)

ASSOCIATION: Institut metalofizyki AN URSR (Institute of Metallophysics AS UkrSSR)

SUBMITTED: February 11, 1960

(For Figs.1 and 2 see next card)

Card 4/5

SVECHNIKOV, V.N.; KOBZENKO, G.F.; KOCHERZHINSKIY, Yu.A.

Investigating by differential thermal analysis transformations in chromium during heating and quenching. Issl. po zharopr. splav. 6:238-239 '60. (MIRA 13:9)
(Chromium—Heat treatment) (Thermal analysis)

SVECHNIKOV, V.N.; PAN, V.M.

Investigating the ternary system chromium - nickel - niobium. Issl. po zharopr. splav. 6:240-250 '60. (MIRA 13:9)
(Chromium-nickel-niobium alloys--Metallography)
(Phase rule and Equilibrium)

SVECHNIKOV, V.N. [Sviechnikov, V.M.], akademik; PAN, V.M.

Transformations in a chromium - nickel system. Dop.AN URSR no.7: 917-920 '60. (MIRA 13:8)

1. Institut metallofiziki AN USSR. 2. AN USSR (for Svechnikov). (Chromium-nickel alloys)

S/601/60/000/011/003/014
D207/D304

AUTHORS: Svechnikov, V. N., Kobzenko, G. F., and Kocherzhinskiy, Yu. A.

TITLE: On the problem of polymorphism of chromium

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 11. 1960. Voprosy fiziki metallov i metallovedeniya, 28-29

TEXT: The authors report observations on phase transformations in electrolytic chromium, reduced in hydrogen and subjected to zone refining in the Otdel tekhnologii splavov Instituta metallofiziki AN USSR (Division of Alloy Technology, Institute of Metal Physics, AS UkrSSR) by V. G. Yepifanov. Differential thermal analysis was carried out using a method described by G. F. Kobzenko and Yu. A. Kocherzhinskiy (Ref. 2: Op. cit., pp. 160-163). The results obtained are shown in a figure as heating

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On the problem of...

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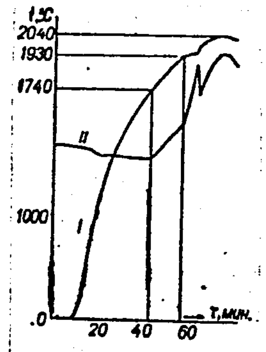
D207/D304



Кривые нагрева хрома.

Heating curves of chromium:
τ - min.

Card 3/3

S/601/60/000/011/004/014
D207/D304

Improving the accuracy...

vacuum resistance furnace was employed. Transition temperatures were determined by four different methods: differential thermal technique, high-temperature dilatometric measurements (an absolute method), differential dilatometry, and method of thermo-electric powers. The differential thermal analysis was carried out using the apparatus developed by G. F. Kobzenko and Yu. A. Kocherzhinskiy (Ref. 5: Op. cit., 160-163). The dilatometric and thermoelectric methods were the same as those described by the authors in an earlier publication (Ref. 6: Sbornik "Voprosy fiziki metallov i metallovedeniya," no. 9, 1959). The differential dilatometric method, based on a Shevenar-type instrument with photographic recording, was used to study the $\alpha \to \gamma$ transition at low temperatures. The alloys were subjected also to microstructure analysis. The most important differences between Vogel and Tonn's results and those reported here are: (1) The $\alpha \to \gamma$ transition temperature was found to be 960°C in alloys with more than 0.03% Zr, in contrast to 835°C reported by Vogel and Tonn; (2) the $\gamma + \delta +$ liquid triple point was found to be

Card 2/3

... -language publications read as follows: ... Soviet-bloc. The re-... -figures ... Kilbone, C. Sykes, J. Inst. of Metals, 39, 182-185, 1928; E. T. Hayes, A. H. Roberson, W. L. O'Brien, Trans. Am. Soc. of Met., 43, 888-905, 1951.

SUBMITTED: September 10, 1959

Card 3/3

SVECHNIKOV, V.N., [Seviechnikov, V.M.] akademik; PAN, V.M.

Diagram of state of Cr - Ni - Nb. Dop. AN URSR no.10:1290-1295 '61. (MIRA 14:11)

1. Institut metallofiziki AN USSR. 2. AN USSR (for Svechnikov).
(Phase rule and equilibrium)
(Systems(Chemistry))

35179

S/601/61/000/013/011/017
D207/D302

18.1735

AUTHORS: Svechnikov, V. N. and Kobzenko, G. F.

TITLE: An investigation of the ternary system chromium-niobium-molybdenum

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot, no. 13, 1961. Voprosy fiziki metallov i metallovedeniya, 115-117

TEXT: The authors report some results on the composition and hardness of Cr-Nb-Mo alloys prepared by melting in an argon-filled arc furnace. After annealing at 1550°C for 32 hours and quenching, two homogeneous phases, α and β, and a two-phase region (α + β) were found. Differential thermal analysis of the pseudobinary alloys Cr_2Nb-Mo gave a constitutional diagram with a eutectic point at 15% Mo and a peritectoid transition at 1620°C. Hardness was measured with the ВИМ-1М (VIM-1M) apparatus using a diamond indentor in vacuum. It was found that addition of Nb and Mo to Cr increased X

Card 1/2

S/601/61/000/013/011/017
D207/D302

An investigation of ...

the latter's hardness at temperatures up to 1000°C. There are 2 figures and 1 table.

SUBMITTED: August 15, 1960

X

Card 2/2

25858
S/020/61/139/004/018/025
B103/B206

18.9200

AUTHORS: Svechnikov, V. N., Academician AS UkrSSR, and Shurin, A. K.

TITLE: The phase diagram iron - hafnium

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 139, no. 4, 1961, 895-898

TEXT: The authors investigated the system Fe-Hf and drew up its phase diagram (Fig. 3). The properties of Hf have been investigated insufficiently; the authors were unable to find publications on the Fe - Hf phase diagram. This is explained by the fact that so far Hf could not be produced without large amounts of impurities. Its melting point has not been established either, nor the temperature of the allotropic transformation existing in Hf. The authors prepared most of the alloys on the basis of electrolytic iron which was annealed in hydrogen and then in vacuo. Carbonyl iron was used for part of the alloys. After purification, the iron contained a maximum of 0.01% C, Si, Mn, S, P, or N each. The metallic hafnium iodide used contained 0.5% Zr and 0.2% Mo. The 25 alloys prepared were remelted in the arc furnace 5 to 6 times in pure argon. The apparatus used for the thermal

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S/020/61/139/004/018/025
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The phase diagram iron - hafnium

analysis was described previously (V. N. Svechnikov & al., Ref. 12: Mashinostroyeniye, No. 5, 76 (1960)). Tungsten-iridium thermocouples and ВР5/20 (VR 5/20) (W + 5% Re — W + 20% Re) were used. The dilatometer is also described in Ref. 12. The phase components of the alloys were determined by X-ray structural analysis. A filtered cobalt $K\alpha$-radiation in a cylindrical camera was used. The Curie point of the alloys was determined with the anisometer by Akulov [Abstracter's note: Anisometer not stated] (methods: V. G. Permyakov & al., Zav. lab., 21, No. 6, 695 (1955)). The authors established that in alloys with less than 45% Hf four transformations take place in the solid state: Two magnetic ones in α-iron and in the intermetallide, a third which is linked with the transformation of α-iron into γ-iron, and a fourth which corresponds to the transformation of γ-iron into δ-iron. The heat of transformation for $\alpha \longrightarrow \gamma$ was determined dilatometrically at a heating rate of up to 0.5 deg/min. The $\alpha \longrightarrow \gamma$ transformation took place in the initial iron (C-content up to 0.01%) at a heating rate of 0.2-0.3 deg/min between 894 and 905°C. The heating and cooling dilatograms do not permit the distinction between the transformation $\alpha + \varepsilon \longrightarrow \gamma + \varepsilon$ and $\alpha \longrightarrow \gamma$. The greatest solubility of Hf in α-Fe (peritectic point) amounts to 0.2%. It was

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The phase diagram iron - hafnium

determined on the basis of the intersection point of the peritectic horizontal with the extrapolated curve of the $\alpha \longrightarrow \gamma$ transformation. Characteristic features were a) the temperature increase of the transformation $\alpha + \varepsilon \longrightarrow \gamma + \varepsilon$ with increasing Hf content in alloys, and b) the spreading of the transformation over a considerable temperature interval. For this reason, the above temperature which amounts to $935 \pm 5^{\circ}C$, was determined from the dilatogram of the two-phase alloy $(\alpha + \varepsilon)$, whose composition lies closest to the peritectic point. The transformation $\gamma + \varepsilon \longrightarrow \delta$ takes place on the basis of a eutectic reaction at $1330 \pm 5^{\circ}C$. The eutectic alloy contains 2.8% Hf. At $1330^{\circ}C$, the maximum Hf solubility in γ-Fe is 1.6%. In alloys with 70 - 99% Hf, two transformations take place in the solid state: 1) magnetic transformation of the intermetallide; the coefficient of thermal expansion is strongly changed here; 2) eutectic transformation at $1235 \pm 10^{\circ}C$ according to the reaction: $\varepsilon + \alpha_{Hf} \rightleftarrows \beta_{Hf} + \varepsilon$. 2) is accompanied by a noticeable thermal effect and a considerable volume increase (during heating). From this, the authors conclude that the

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solubility of Fe in Hf is low (certainly below 1%). The fusibility diagram was drawn up only on the basis of a differential thermal analysis. The authors established two eutectic transformations in the system Fe - Hf: A) $L \rightleftarrows \beta_{Hf} + \varepsilon$ at $1300 \pm 10^{\circ}C$ and B) $L \rightleftarrows \gamma + \varepsilon$ at $1350 \pm 10^{\circ}C$. The Hf content in the eutectic alloys is 85 and 21.5%, respectively. The crystal lattice of the alloys containing the intermetallide Fe_2HF (ε-phase) was determined by X-ray structural analysis as being hexagonal and of the $MgZn_2$ type. The parameters of this lattice were not the same in alloys of various compositions. From this, the authors conclude that a considerable range of homogeneity of the ε-phase exists in some alloys. The boundaries of the mono-phase range were found at $1200^{\circ}C$ by direct determination of the hafnium content in the ε-phase. I. D. Marchukova (Institut metallurgii AN SSSR - Institute of Metallurgy, AS USSR) made the chemical analysis of this phase by X-ray structural analysis with the PCAШ-2 (RSASh-2) apparatus. In the ε-phase of alloy no. 18, 50% Hf were formed, and in no. 21 64%. Since Fe_2Hf is ferromagnetic, the Curie point of the ε-phase was determined

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B103/B206

The phase diagram iron - hafnium

in several alloys, i. e., for various compositions of the ε-phase. In this way, it was proved that the Curie point drops from 405 to 145°C with an increase of the Hf content in the intermetallide from 50 to 64%. The composition of the ε-phase in the alloys was changed owing to long annealing (over 100 hr). The Curie point dropped in alloy no. 18 from 405 to 377°C, and in no. 21 it increased from 145 to 170°C. The boundaries of the mono-phase range of the intermetallide were determined in this way. The hardness of the intermetallide (determined with the Vickers device) is 650 kg/mm^2, and its melting point is 1810±20°C (for stoichiometric Fe_2Hf), which is much higher than that mentioned by R. P. Elliot, W. Rostocker (Trans. Am. Soc. Metals, 50, 617 (1958)). The authors thank I. B. Borovskiy for making the spectral analysis in his laboratory. There are 3 figures, 1 table, and 13 references: 2 Soviet-bloc and 11 non-Soviet-bloc. The two important references to English-language publications read as follows: P. Duwes (Ref. 5: J. Appl. Phys., 22, No. 9, 1174 (1951); H. K. Adenstedt (Ref. 2: Trans. Am. Soc. Metals, 44, 949 (1952). The third one see in the body of the abstract.

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S/020/61/139/004/018/025
B103/B206

The phase diagram iron - hafnium

ASSOCIATION: Institut metallofiziki Akademii nauk USSR (Institute of Physics of Metals of the Academy of Sciences UkrSSR)

SUBMITTED: April 18, 1961

Fig. 3.

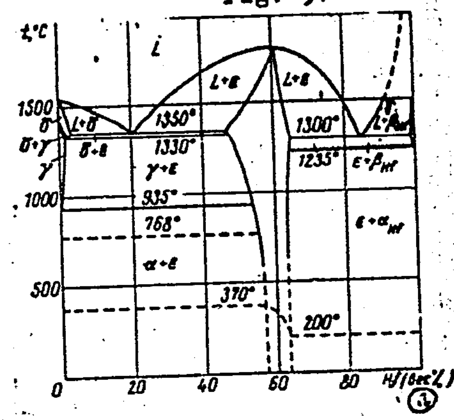

Fig. 3: Phase diagram of the system Fe-Hf. Legend: a) % by weight.

Card 6/6

SVECHNIKOV, V.N.

[Physics of metals and physical metallurgy] Voprosy fiziki metallov i metallovedeniia. Kiev, Izd-vo AN USSR, 1962. 150 p. (MIRA 17:5)

SVECHNIKOV, V.N., akademik; TRUSH, I.Kh., kand.tekhn.nauk

Effect of aluminum on the structure and properties of medium-carbon phosphorus steel with high nitrogen content. Metalloved.i term.obr.met. no.2:2-6 F '62. (MIRA 15:3)

1. Kiyevskiy politekhnicheskiy institut. 2. Akademiya nauk USSR (for Svechnikov).
(Steel alloys) (Aluminum coating)

S/659/62/008/000/006/028
I048/I248

AUTHORS: Svechnikov, V.N., and Pan, V.M.

TITLE: Phase diagrams for the systems chromium-niobium and chromium-niobium-nickel

SOURCE: Akademiya nauk SSSR. Institut metalurgii, Issledovaniya po zharoprochnym splavam. v.8. 1962. 47-56

TEXT: The Cr-Nb, the quasibinary $NbCr_2$-Ni_3Nb, and the Cr-Nb-Ni systems were studies in detail by differential thermal analysis and by x-ray diffraction analysis; the phase diagrams derived are shown. The Cr-Nb alloy containing 47.18% Nb (i.e., corresponding to the stoichiometric $NbCr_2$ composition) was found to undergo an allotropic transformation at 1590°C, and to have a m.p. of 1720°C; the allotropic transformation is associated with a transition from a low temperature β structure of the $MgCu_2$ type to a high-temperature one (ε) of the $MgZn_2$ type with lattice parameters a=4.92 and c=8.10 kX. The width of the zone on the binary phase diagram does not exceed

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S/659/62/008/000/006/028
I048/I248

Phase diagrams for the systems...

1.5% but its boundaries are uncertain. In the system Nb-Cr, an eutectoid transformation ($\varepsilon \rightleftarrows \alpha + \beta$) occurs at 1585°C in Cr-rich alloys, while a peritectoid transformation ($\alpha + \gamma_{Nb} \rightleftarrows \beta$) takes place at 1625°C in Nb-rich alloys. The addition of >5-6% Ni to the $NbCr_2$, with tempering at 1100°C, causes the formation of a new phase which is assumed to consist of a solid solution of Ni in the ε-modification of $NbCr_2$; the solubility of Ni in the ε-phase is 36% at 1100°. A four-phase peritectoid equilibrium $\gamma + \varepsilon \rightleftarrows \alpha + \delta$ (where δ is Ni_3Nb) exists at 1160°C in the Cr-Ni-Nb diagram, in the section confined within the Cr-Ni-Ni_3Nb-$NbCr_2$ quadrangle; the composition of the peritectoid point is: 30.0% Cr, 23.5% Nb, 46.5% Ni. This quadrangle contains one quasibinary section only, namely, the $NbCr_2$-Ni_3Nb one. There are 9 figures and 1 table.

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S/659/62/008/000/007/028
I048/I248

AUTHORS: Svechnikov, V.N., Kocherzhinskiy, Yu.A., Latysheva, V.I., ~~and Pan, V.M.~~

TITLE: A study of chromium-niobium-titanium alloys

SOURCE: Akademiya nauk SSSR. Institut metalurgii. Issledovaniya po zharoprochnym splavam. v.8. 1962. 56-61

TEXT: This is part of a systematic study of ternary systems consisting of Cr, Nb, and various third components; this part deals with Cr-based alloys containing up to 47.5% Nb and 37.5% Ti, and with Nb-based alloys containing up to 30% Cr and 30% Ti. The isothermal sections at 1250°C and 1380°C are presented. In the Cr-rich corner (above 60% Cr) there are three one-phase regions (α-solid solution based on Cr, β-solid solution based on $NbCr_2$, and γ-solid solution based on $TiCr_2$), three two-phase regions ($\alpha+\beta$, $\alpha+\gamma$, $\beta+\gamma$) and one three-phase region ($\alpha+\beta+\gamma$) at 1250°C; at 1380° only α, β, and $\alpha+\beta$ exist and a liquid phase (composition 25-35% Ti, 5-15% Nb) is observed. In the Nb rich corner (above 70%

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I048/I248

A study of chromium-niobium-titanium alloys

Nb) there are a single phase region δ (Nb-based solid solution) and a two-phase region $\beta + \delta$; the δ region is enlarged on heating to 1380° but both regions exist at 1250 and 1380°C. Although some of the alloys in the system studied are characterized by a high hardness (e.g., H_T = 1187 kg./sq.,m. for the alloy containing 30% Cr, 70% Nb at 600°C), and other are characterized by high resistance to scale formation at high temperatures (e.g., the alloy containing 25% Cr, 5% Ti), there are no alloys which have both properties simultaneously. There are 4 figures and 2 table.

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S/601/62/000/015/008/010
A004/A127

AUTHORS: Svechnikov, V.N., Pan, V.M.

TITLE: Diagram of phase equilibria of the Cr-Ni-Ni_3Nb-$NbCr_2$ system

SOURCE: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 15. Kiev, 1962. Voprosy fiziki metallov i metallovedeniya, 156 - 163

TEXT: The equilibrium diagram of the Cr-Ni-Nb system has not been known hitherto. The authors cite a number of bibliographic references in which attempts were made to plot the diagram of similar systems. To investigate the Cr-Ni-Ni_3Nb-$NbCr_2$ system, 180 alloys were produced in an arc furnace with tungsten electrode. The alloy materials were chromium of 99.95%, niobium of 99.97% and 99.4%, and nickel of 99.99% purity. The alloys were subjected to annealing at 1,100°C for 107 hours in an argon atmosphere. The following test methods were used: differential thermic, hardening and x-ray diffraction, hardening and microstructure, dilatometric, durometric (microhardness) analyses, the method of diffusion vapors and micro-x-ray spectral analysis. As a result of these investigations, the com-

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S/601/62/000/015/009/010
A004/A127

AUTHORS: Svechnikov, V.N., Pan, V.M.

TITLE: The special features of the equilibrium diagram and the dissolution and separation processes in the Cr-Ni system

PERIODICAL: Akademiya nauk Ukrayins'koyi RSR. Instytut metalofyzyky. Sbornik nauchnykh rabot. no. 15. Kiev, 1962. Voprosy fiziki metallov i metallovedeniya, 164 - 178

TEXT: 27 alloys with a nickel content of up to 65% were produced for testing purposes. Refined electrolytic chromium containing 0.0022% O, 0.009% N, 0.004% Si, not more than 0.0003% Pb, Sn, Bi, Sb, Cd, and HO (NO) grade nickel of 99.99% purity were used as initial materials, the alloys being smelted partly in an arc furnace and partly in a furnace of the Tamman type in crucibles of Al-oxide. A detailed table of the alloy compositions and their annealing conditions is presented. As a result of the tests carried out, the absence of eutectoid and other non-variation transformations in the Cr-Ni system was found in the solid state. The diagram of fusibility of the Cr-Ni-system and the solubility curve of

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nickel in chromium were plotted again. It was found that the solubility is considerably reduced with a decrease in temperature (from 39.5% at 1,345°C to 0.1% at 800°C). The heat value of dissolving nickel in chromium was rated and proved to be 46,000 cal/mole. Some anomalous volumetric effects in tempering hardened Cr-Ni alloys with a nickel content of 30 - 40% at 1,310°C were detected. The origin of these effects could not be cleared up. There are 9 figures and 2 tables.

SUBMITTED: June 28, 1961

SVECHNIKOV, V.N.; KOCHERZHINSKIY, Yu.A.; LATYSHEVA, V.I.; PAN, V.M.

System chromium - niobium - titanium. Sbor. nauch. rab. Inst.metallofiz. AN URSR no.16:128-131 '62. (MIRA 16:5)

(Chromium-niobium-titanium alloys--Metallography)
(Phase rule and equilibrium)

SVECHNIKOV, V.N.; KOCHERZHINSKIY, Yu.A.; LATYSHEVA, V.I.

Constitutional diagram of the system chromium - titanium. Sbor. nauch. rab. Inst.metallofiz. AN URSR no.16:132-135 '62. (MIRA 16:5)
(Chromium-titanium alloys--Metallography)
(Phase rule and equilibrium)

SVECHNIKOV, V.N.; SPEKTOR, A.TS.

Constitutional diagram of the system iron - zirconium. Sbor. nauch. rab. Inst.metallofiz. AN URSR no.16:136-144 '62. (MIRA 16:5)
(Iron-zirconium alloys--Metallography)
(Phase rule and equilibrium)

SVECHNIKOV, V.N.; SPEKTOR, A.TS.

Constitutional diagram of the system $ZrCr_2$ - $ZrFe_2$. Sbor. nauch. rab. Inst.metallofiz. AN URSR no.16:145-152 '62. (MIRA 16:5)

(Chromium-zirconium-iron alloys--Metallography)
(Phase rule and equilibrium)
(Intermetallic compounds)

SVECHNIKOV, V.N.; KOCHERZHINSKIY, Yu.A.; SHURIN, A.K.; PAN, V.M.; SPEKTOR, A.TS.; KOBZENKO, G.F.; BOYKO, Yu.A.

Apparatuses for the physicochemical investigation of high-melting and chemically active metals. Sbor. nauch. rab. Inst.metallofiz. AN URSR no.16:220-230 '62. (MIRA 16:5)

(Physical metallurgy—Equipment and supplies)

SVECHNIKOV, V.N.; YAKOVCHUK, Yu.Ye.; BELYAYEVA, V.P.

Effect of alloying on the cold brittleness of medium carbon phosphorous steel. Report no.2. Izv.vys.ucheb.zav.; chern.met. 5 no.6:120-127 '62. (MIRA 15:7)

1. Kiyevskiy politekhnicheskiy institut.
(Steel alloys--Brittleness)

S/148/62/000/012/005/008
E073/E151

AUTHORS: Svechnikov, V.N., and Golubev, S.S.

TITLE: On the influence of phosphorus on the temper brittleness of steel

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy, Chernaya metallurgiya, no.12, 1962, 117-119

TEXT: The influence of phosphorus on cold-shortness and temper-brittleness of steel was determined. Three heats with the following compositions were produced in a 30 kg high-frequency furnace:

Heat	C	Mn	Si	S	P
1	0.47	0.50	0.11	0.032	0.014
2	0.45	0.50	0.20	0.027	0.060
3	0.44	0.55	0.08	0.028	0.150

Heat 1 was not deoxidised; heats 2 and 3 were deoxidised with aluminium (300 g/ton). From the ingots square rods were forged and normalised at 850 °C; the impact specimens machined from the rods were water-quenched from 820 °C, tempered for two hours at

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APPROVED FOR RELEASE: 08/31/2001 CIA-RDP86-00513R001654110011-1"

620 °C, then half of the specimens from each heat were quenched in 5% aqueous caustic soda, the other half being cooled to 300 °C at the rate of 40 deg/hour, followed by furnace cooling. Specimens from heat 1 (0.014% P, non-deoxidised) were prone to brittle fracture at -60 and -78 °C, regardless of the rate of cooling after tempering. However, specimens from heats 2 and 3 did not become completely brittle even at -78 °C; those slowly cooled had an impact strength of at least 3.0 kgm/cm^2. An increase in the P concentration from 0.06 to 0.15% appreciably affected the impact strength at low temperatures. The impact strength of slowly cooled specimens from heat 3 was 30% lower than that of rapidly cooled specimens but still appreciable, 3.5 kgm/cm^2 at -60 °C. Although phosphorus increased the tendency to temper brittleness, non-deoxidised steel of low P content was even more prone to brittleness. This is attributed to the difference in the state of the nitrogen in the deoxidised and non-deoxidised steels resulting in the formation of reversible temper brittleness in the latter. The N content was about 0.005% and, therefore, its influence could not be attributed to its effect on the austenite grain size.

On the influence of phosphorus ... S/148/62/000/012/005/008
E073/E151

There are 3 figures and 1 table.

ASSOCIATION: Kiyevskiy politekhnicheskiy institut
(Kiev Polytechnical Institute)

SUBMITTED: February 12, 1962

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26595

S/126/62/013/003/008/023
E111/E435

18.1110

AUTHORS: Svechnikov, V.N., Golybev, S.S., Solodey, I.M.

TITLE: Influence of deoxidation with aluminium on austenite grain growth and the cold-brittleness of steel

PERIODICAL: Fizika metallov i metallovedeniye, v.13, no.3, 1962, 387-393

TEXT: The authors state that although there is indirect evidence that grain growth in aluminium-deoxidized steel is retarded by aluminium nitrides, this has not yet been proved by a direct experiment showing the presence of the highly-dispersed nitrides at the boundaries of fine austenite grains. The object of the present investigation was to supply data on this and the related questions, to assist the formulation of a theory explaining the role of deoxidation with aluminium in the production of fine-grain steel. Two heats of a medium-carbon steel were treated while liquid with ferro-phosphorus and nitrogen to give about 0.1% P and 0.007 and 0.010% N. Aluminium (300 g/ton) was introduced into the stream of metal going into

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S/126/62/013/003/008/023
E111/E435

Influence of deoxidation ...

the ingot mould. Forged and normalized 15 x 15 mm bars were used; for studying grain growth in cast steel, small test pieces were cut from ingots before forging. Tendency to austenite-grain growth was measured by a published method, grain size being determined from the ferrite lattice. The authors conclude that grain growth is, in fact, hindered by highly dispersed aluminium nitrides at grain boundaries. Heat treatments leading to coagulation of the nitrides produce austenite grain growth, the growth starting temperature being reduced by about 150°C by suitable heat treatment. The growth-hindering effect can be restored by heat treatment leading to solution of the coagulated nitrides. The growth starting temperature can be raised almost to that in cast steel. Investigation of cold brittleness after various heat treatments indicates that, in addition to grain size, other factors also substantially affect the cold-brittleness limit: in steel annealed at 820°C with a fine-grained ferrite-pearlite structure, the temperature for transition into the brittle state is almost 100°C higher than in fine-grained steel normalized from the same temperature. The authors conclude that

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S/126/62/013/003/008/023
E111/E435

Influence of deoxidation ...

embrittlement in annealing is due to the same structure of changes that produce reversible temper brittleness. There are 6 figures and 1 table.

ASSOCIATION: Kiyevskiy politekhnicheskiy institut (Kiyev Polytechnical Institute)

SUBMITTED: May 12, 1961

Card 3/3

SVECHNIKOV, V.N., akademik; TRUSH, I.Kh., kand.tekhn.nauk

Effect of nitrogen on the cold brittleness of medium carbon phosphorous steel containing arsenic. Stal' 22 no.1:64-65 Ja '62. (MIRA 14:12)

1. Akademiya nauk USSR (for Svechnikov).
(Steel--Brittleness))

35523

21.2100
18.1150

S/020/62/143/003/021/029
B101/B144

AUTHORS: Svechnikov, V. N., Member of the AS UkrSSR, and Spektor, A. Ts.

TITLE: The iron-zirconium phase diagram

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 143, no. 3, 1962, 613 - 615

TEXT: Following an earlier work (Vopr. fiziki metallov i metalloved. Sborn. nauchn. rabot Inst. metallofiziki AN USSR, no. 11, 1960, p. 30) on the Fe-Zr phase diagram in the range 0 - 16% Zr, the range 16 - 52% Zr was now closely examined, the range 52 - 100% Zr only approximately and preliminarily. 22 alloys were prepared from electrolytic iron refined in H_2 and from zirconium iodide by crucibleless melting in an arc furnace.

The melting diagram was plotted from data of the differential thermal analysis while heating from 40°C to 50°C/min. A special device was used (Mashinostroyeniye, Nauchno-tekhnich. sborn. no. 5, Inst. tekhnich. informatsii, Kiyev, 1960, p. 76) which kept the material clean. Thermal analysis after 18 hr annealing at 1250°C in a modernized ТВВ-2М (TVV-2M) oven in argon atmosphere yielded, in the case of 20 - 40% Zr, nonreproducible peaks dependent on the pretreating of the material, from which was

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concluded that the alloys were not yet in equilibrium. Thus, an additional annealing (56 hr at 1250°C, 8 hr at 1450°C) was carried out for alloys containing ≥29% Zr, which yielded alloys in a state of equilibrium. The complete phase diagram of the Fe-Zr alloys was now plotted, drawing on data from the previous work (Fig. 1). Two phases were found, the ε phase based on $ZrFe_2$, and an η phase which corresponded to no stoichiometric formula. The determination of the homogeneity boundary of the η phase from data of microstructure, and the X-ray analysis showed contradictions still unsolved. The change in hardness and in the lattice constant of the ε phase was also measured as a function of the Zr content (Fig. 3). As the range above 52% was only determined from a few non-annealed samples, more exact investigation may reveal chemical compounds. There are 3 figures and 5 references: 2 Soviet and 3 non-Soviet. The reference to the English-language publication reads as follows: E. T. Hayes, A. H. Roberson, W. L. O'Brien, Trans. ASM, 43, 888 (1951).

ASSOCIATION: Institut metallofiziki Akademii nauk SSSR (Institute of Physics of Metals of the Academy of Sciences USSR) [Abstracter's note: USSR probably a misprint, should be: UkrSSR]

ACCESSION NR: AT4010698 S/2601/63/000/017/0174/0180

AUTHOR: Svechnikov, V. N.; Spektor, A. Ts.

TITLE: A phase diagram of the chromium-zirconium system

SOURCE: AN UkrRSR. Insty*tut metalofizy*ky*. Sbornik nauchny*kh trudov, no. 17, 1963. Voprosy* fiziki metallov i metallovedeniya, 174-180

TOPIC TAGS: chromium-zirconium system, chromium, zirconium, eutectic point, solid alloy, polymorphism, intermetalloid, alloy phase diagram, metal solubility

ABSTRACT: The article begins with an account of the work done by R. F. Domagala, D. H. McPherson and M. Hansen (Journal Metals, No. 5, 279-283, 1953), who were the first to give the full phase diagram of the Cr-Zr system. The purpose of the investigation conducted by the authors was to derive a phase diagram for the ternary system Cr-$ZrCr_2$-$ZrFe_2$-Fe. In connection with this problem, a binary Cr-Zr diagram was derived for the parts of the system rich in Cr, Cr-$ZrCr_2$. Investigation of the parts rich in Zr, $ZrCr_2$-Zr was limited to verifying previous experiments. The alloys were prepared on a base of Zr and Cr iodide which was electrolytically refined in hydrogen by melting the Cr in an arc furnace in a purified argon medium. To work out the phase diagram differential-

ACCESSION NR: AT4010698

thermal analysis was used with heating at the rate of 0.7-0.8 deg/sec. The compositions of 26 alloys were analyzed and are shown in Table 1 of the Enclosure. Of these 26 samples, 20 belonged to the class of alloys rich in Cr; these were used to derive the phase diagram of Cr-$ZrCr_2$. Before the analysis all the alloys were subjected to 1200C (in argon) for 24 hours. Temperatures at the beginning and end of fusion are given in Table 1. To make the location of eutectic (maximum fusibility) points more precise, metallographic and thermal analysis were used. The composition of eutectic components was determined in pre- and post-eutectic alloys, and from this data the composition of the eutectic alloys was determined. The fusion temperature of alloys rich in Cr was found to be between 1580 and 1590C. The position of the eutectic point was determined at approximately 30% Zr by weight. To determine the borders of the phase zones in alloys in the solid state, roentgenostructural analysis was used. The structural diagram of Cr-Zr obtained by experimental data is given in Figure 1 of the Enclosure. This diagram confirms a diagram given by Domagala et al. with respect to the main characteristics of the solidus curve, and adds to the Domagala diagram by working out the liquidus curve. The melting point of the alloy closest to the intermetalloid in composition was found to be 1675C. The maximal solubility of Cr in the intermetalloid was marked by the intersection of the solidus curve with the eutectic horizontal line. Because of the low levels of solubility and the difficulties in its experimental evaluation, determinations of the borders

ACCESSION NR: AT4010698

of solubility were not precise. The curve of solubility of Zr in Cr was drawn approximately, according to the data obtained by microstructural analysis of two alloys with 0.51 and 1.54 % Zr. Orig. art. has: 5 figures and 2 tables

ASSOCIATION: Insty*tut metalofizy*ky* AN UkrRSR (Institute of Metallurgical Physics AN UkrRSR)

SUBMITTED: 00 DATE ACQ: 31Jan64 ENCL: 03

SUB CODE: MM NO REF SOV: 002 OTHER: 004

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ACCESSION NR: AT4010698

ENCLOSURE: 01

TABLE 1

Sample number	Zirconium content, weight %	Temperature at the beginning of fusion, °C	Temperature at the end of fusion, °C	Comment
1	0.51	--	--	Thermal analysis of alloys No. 1-9 was not conducted
2	1.03	--	--	
3	1.54	--	--	
4	2.26	--	--	
5	3.5	--	--	
6	4.63	--	--	
7	5.75	--	--	
8	9.25	--	--	
9	17.16	--	--	
10	20.21	1580	1680	
11	25.24	1580	1625	
12	35.64	1590	1620	
13	36.1	--	--	
14	31.88	1590	1610	
15	42.71	1590	1650	

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ACCESSION NR: AT4010698 TABLE 1 (Continued) ENCLOSURE: 02

Sample number	Zirconium content, weight %	Temperature at the beginning of fusion, °C	Temperature at the end of fusion, °C	Comment
16	45.21	1590	1655	
17	47.0	1640	1675	Transmutation $\beta \to \varepsilon$ 1150° C
18	47.1	1630	1675	
19	45.5	1620	1660	
20	46.0	1630	--	
21	46.5	1630	1670	
22	47.5	1595	1670	Transmutation $\beta \to \varepsilon$ 1150°C
23	48	--	1670	
24	70	1260	1475	Eutectic transmutation 840°, transmutation $\beta \to \varepsilon$ 1170°c
25	82	1280	--	
26	88	1270	1450	Eutectic transmutation, 830°C

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BR

ACCESSION NR: AT4010699 S/2601/63/000/017/0181/0186

AUTHOR: Svechnikov, V. N.; Spektor, A. Ts.

TITLE: A phase diagram of the ternary system chromium-iron-zirconium

SOURCE: AN UkrRSR. Insty*tut metalofizy*ky*. Sbornik nauchny*kh trudov, no. 17, 1963. Voprosy* fiziki metallov i metallovedeniya, 181-186

TOPIC TAGS: phase equilibrium, ternary system, alloy phase composition, metastable structure, chromium iron zirconium alloy, phase transition, peritectic plane

ABSTRACT: The authors undertake to determine the phase diagram of the ternary system Cr-Fe-Zr with not more than 45-47% Zr by weight; i.e., the part within the tetragon included between the components Cr, Fe and the intermetallic compound $ZrCr_2$, $ZrFe_2$ ($Cr-ZrCr_2-ZrFe_2-Fe$). The basic methods of investigation were: differential-thermal, dilatometric, roentgeno-structural, microstructural, durometric, thermoelectromotive, magnetic and volumetric; 365 alloys were prepared. Disposition of the basic part of the alloy is shown in the concentration triangle in Fig. 1 of the Enclosure. A diagram of the fusability of the system $Cr-ZrCr_2-ZrFe_2-Fe$ is shown in Fig. 2 of the Enclosure. The authors found that the structural diagram of Fe-Zr can be both metastable and stable;

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ACCESSION NR: AT4010699

furthermore, the diagram of the ternary system can also be metastable and stable, as shown in Figs. 3 and 4 of the Enclosure. On the sides of the tetragon Cr-$ZrCr_2$-$ZrFe_2$-Fe, corresponding binary systems were shown which have 7 non-variant lines in the case of metastable condition (Fig. 3) and 8 non-variant lines for the stable condition (Fig. 4). Another non-variant line was formed in connection with the appearance of a new intermediate phase. In both cases, near the Cr-Zr side of the diagram the phase conversions were explained by the existence of a four-phase, non-variant, peritectic plane with temperatures near 1570C and with concentrations of about 10% Fe by weight. Near the Fe-Zr side the phase transitions were explained in the diagram of metastable equilibrium by two four-phase, non-variant, peritectic planes with temperatures and concentrations near 1320C and 8% Cr and 1320C and 2% Cr. In the diagram of stable equilibrium the transitions were explained by three four-phase, non-variant, peritectic planes with temperatures and concentrations about: 1450C and 5% Cr, 1320C and 8% Cr, and 1320C and 2% Cr. Because of the small extent of the area of four-phase equilibrium it was difficult to prepare alloys which by their composition would fall into this part of the diagram. Orig. art. has: 7 figures.

ENCLOSURE: 01

ACCESSION NR: AT4010699

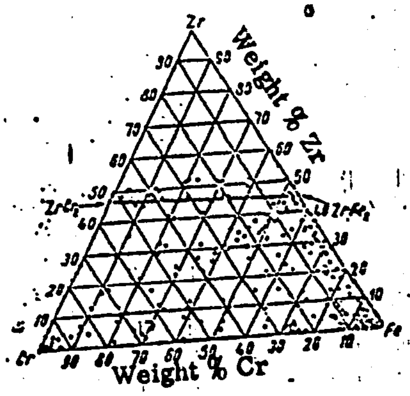

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Fig. 1 The disposition of the basic part of the alloys in a concentration triangle